R. sanguineus. Maharashtra: 1 ♂, 2 ♀♀, A 34056, dog, Ganeshkhind, Poona, 12 April 1961; 5 ♂♂, 6 ♀♀ Lab. No. 341, (F 1 progeny of parents collected off dog on 12 September 1961, at Shewalwadi, Poona, A 34074).

As the illustrations show, there is considerable degree of variation in the shape of the adanal shields and the spiracular plates between the two extremes. While further work, including laboratory rearing and studying variations in the progeny of single female is in progress, this brief note is being presented solely with a view to alert the Indian workers on ixodid ticks to re-identify the *R. sanguineus* in their collections in order to determine its true identity, and look out for the presence of *R. turanicus.*

VIRUS RESEARCH CENTRE,[1]
POONA-1,
April 19, 1968.

VIJAI DHANDA
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20. *SYSTROPUS OPHIONEUS* WESTWOOD (DIPTERA: BOMBYLIDAE) AS A PARASITE OF SLUG CATERPILLARS (LEPIDOPTERA: LIMACODIDAE) IN INDIA

(With a plate)

Two slug caterpillars (Lepidoptera: Limacodidae) were collected at Kalimpong, Darjeeling District, West Bengal, on the 7 November, 1962, on an unidentified plant at an altitude of 3900 ft. These larvae

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formed cocoons on 8 and 15 November, 1962, respectively. These cocoons were brought down to Delhi in January, 1963, and kept under observation in an airconditioned room maintained at a temperature of about 74°F. About six months after the formation of the cocoons (on 10 and 15 May, 1963, respectively) a male and a female parasite emerged out of the two cocoons instead of the expected limacodid moths. The parasites were identified as *Systropus ophioneus* Westwood (Diptera: Bombylidae).

Westwood (1876) recorded five species of *Systropus* from different countries of Asia, namely, *S. ophioneus* Westwood and *S. eumenoides* Westwood from India, *S. polistoides* Westwood from Siam, *S. sphegoides* Walker from Celebes and *S. tipuloides* Westwood from Malaya. Brunetti (1909) besides mentioning *S. blumei* Voll. and *S. tessalatus* Voll. from Java and Sumatra, respectively, added a new species, *S. nigricaudus* from Sikkim, Nepal and Mussoorie. Since then three more species were recorded from the Oriental region, namely, *S. roepki* de Meyer (1914) from Java, *S. hoppo* Matsumara (1918) from Formosa and *S. varipes* Edwards (1919) from Sumatra. Brunetti (1920) added two more species *S. edwardsi* and *S. flavipleura* from Burma and Assam. He also showed that *S. nigricaudus* erected by him as a new species in 1909 was a synonym of *S. ophioneus* Westwood. *S. studyi* Enderlein (1926) was recorded from South China. The above mentioned species, so far recorded from this region, have all been taken as adults only and nothing is on record regarding their larval habits.

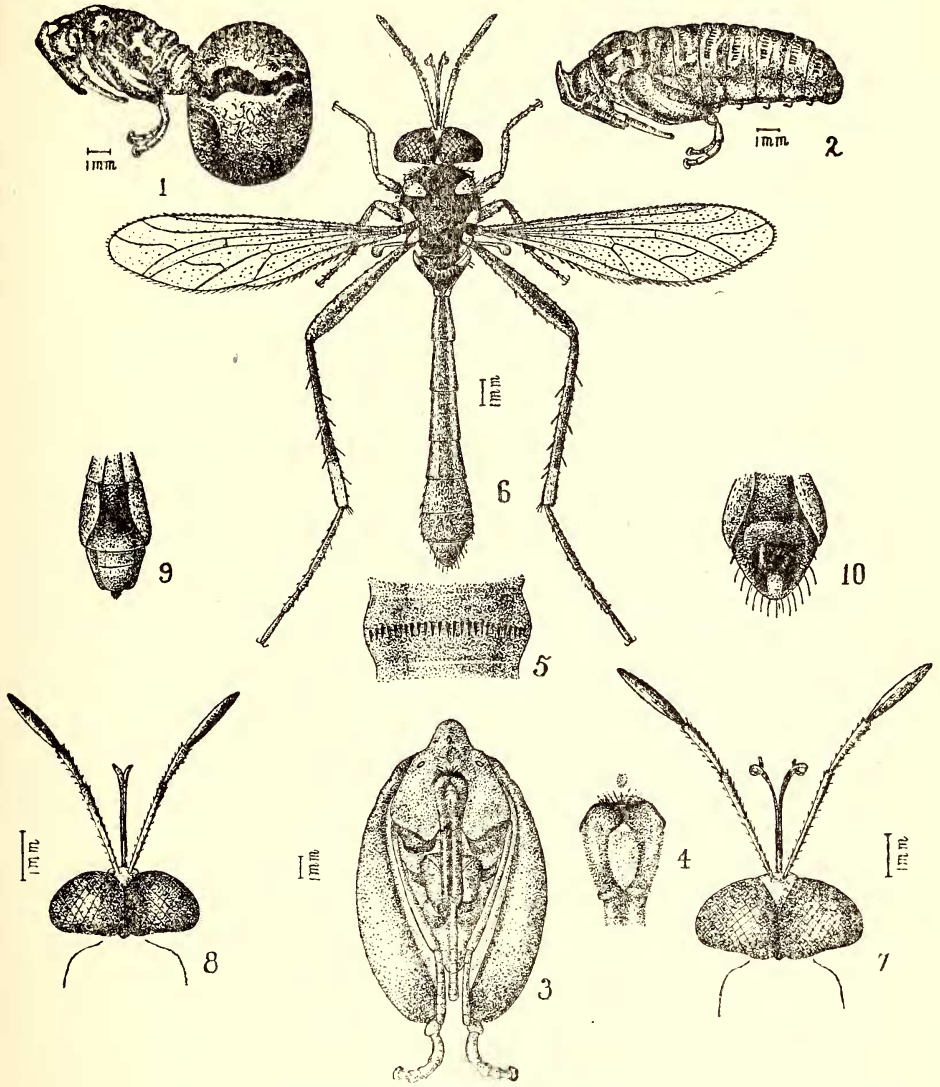
The African species, *S. crudalis* Westwood had been recorded by him as having been taken from inside the cocoon of a limacodid, probably of the genus *Parasa* from Natal. Kunckel D'Herculais (1905) described the pupa of *S. conopoides* taken from the cocoon of the limacodid, *Sibine bonaerensis*. Corbett (1933) reported a *Systropus* sp. from the cocoon of the limacodid, *Chalcoscelis albiguttata* Snellen, a pest of coconut in Malaya. More recently Allen & Bull (1954) recorded another *Systropus* sp. (near *tessemanni* Enderlein) parasitising cocoons of a *Parasa* sp. (near *serratilinea* B. B.) and another *Parasa* sp. both pests of oil palms (*Elasis guinensis*) in Nigeria. No further record of parasitism of *Systropus* is available.

The following observations have been made on *S. ophioneus* that have been reared out by the authors. Since it has been the larvae of the limacodid that have been collected from the field and there was no chance of any adult parasites having entered the cages in which they made their cocoons and pupated, the parasitisation must have been definitely during the larval stage of the host. The pupa

of *S. ophioneus* possesses similar interesting morphological features with minor differences in detailed structure as noted by Westwood in *S. crudalis*. The frons of the pupa of *S. ophioneus* possesses a strongly sclerotised more or less semilunar ridge at the base of the antennal sheath instead of a frontal conical projection as in *S. crudalis* and a short longitudinal ridge at the middle of the semi-lunar ridge (Figs. 3 & 4). The antennal case in *crudalis* has been described as a long appendage extending along the breast as far as the first ventral segment and its basal half grooved along the middle as though it consists of two halves. In *ophioneus* the two antennal sheaths are quite distinct extending beyond the prothoracic sternum. The flagellar portions of the antennal case, except at the tip, are approximated and held close to one another by a membrane forming a longitudinal groove in the middle. The sheath of the proboscis extends up to the base of the sheaths of hind legs. The sheaths of the forelegs are very short, lying close to one another, and their distal ends are pointed. The sheaths of the middle legs are elongated and extend up to the posterior extremity of the wing covers and the sheaths of the hind legs are covered with the posterior ends of wing covers excepting the posterior extremity of the tibiae and tarsal segments as in *crudalis*. The abdominal segments, excepting the last, are provided on each side of the pleurites with curved spines, the tips of which point cephalad. The dorsal surface of each segment, except that of head and prothorax, is provided with a transverse row of minute straight spines pointing caudad (Figs. 2 and 5).

The semilunar frontal ridge obviously helps the parasite to burst open the operculum of the host cocoon. It also indicates that the parasite pupa has a certain amount of mobility and they are not completely quiescent. The dorsal spines and the lateral spines enable the wriggling pupa to propel itself forward out of the host cocoon and to have a hold on the cocoon which is usually fixed hard to the substratum on which the limacodid pupates, at the time of emergence of the parasite, respectively. As one of the adult parasites emerged after the pupa had wriggled out of the host cocoon, it indicates that the lateral spines in such case help the pupa in getting a hold on the walking surface for the emergence of the adult. Normally, however, the adult parasite emerges when the parasite pupa breaks open the operculum of the host cocoon and holds on the opening (Fig. 1). The adult parasite emerges out of its pupa through rupture of the head and prothorax.

The time taken for the parasite to complete its life history from parasitisation to emergence also indicates that the parasite has a



Systropus ophioneus Westwood

1. Pupal exuiviae attached to limacodid cocoon showing nature of emergence; 2. Lateral view of pupa; 3. Ventral view of anterior part of pupa; 4. Frontal ridge of pupa; 5. Dorsal row of spines on abdominal segment; 6. Adult female; 7. Dorsal view of head of adult female; 8. Dorsal view of head of adult male; 9. Terminal end of abdomen of adult female; 10. Terminal end of abdomen of adult male.